**IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION**

ALIGN TECHNOLOGY, INC.,
 	
     Plaintiff and Counterclaim Defendant,
 	
     v.
 	
3SHAPE A/S and 3SHAPE TRIOS A/S
 	
     Defendants and Counterclaimants.
	C.A. No. 6:20-cv-00979-ADA
	
	JURY TRIAL DEMANDED
	
	PUBLIC VERSION

ALIGN TECHNOLOGY INC.'S RESPONSIVE CLAIM CONSTRUCTION BRIEF

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INTRODUCTION

3Shape is seeking construction on 38 different terms from Align's patents. It is the proverbial attempt to throw everything against the wall to see what sticks. At various points, 3Shape asks the Court to give effect to almost every exception to the general rules of claim construction. And many of 3Shape's proposed constructions attempt to improperly read attributes of preferred embodiments from the specification into the claim language. Neither the specifications, nor Align's statements during prosecution of different patents, contain "clear and unmistakable disclaimer[s]" of claim scope or descriptions of the "present invention" that would limit the claim terms. 3Shape's efforts should be rejected.

Align's seven patents at issue fall into three categories: (1) four Color Scanning Patents; (2) two Selective Rescanning Patents; and (3) one Hole Closing Patent.[1] The Color Scanning Patents relate to using depth data and image data to obtain a 3D color model. The Selective Rescanning Patents relate to using a second scan for an unusable portion of the original scan of the patient's mouth. The Hole Closing Patent relates to manipulating an existing scan to fill in a portion of the scan that is missing.

ARGUMENT

I.   COLOR SCANNING PATENTS

Align's four Color Scanning Patents relate to performing scans to obtain depth and color information about an object to create a color three-dimensional representation of the object. 3Shape raises 24 different claim terms with respect to these patents, which it divides among five issues.

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[1] The Asserted Patents were attached to 3Shape's Opening Brief (Dkt. No. 120) at Exhibits 4–10 and will be referred to herein by patent number.

A.   **[Issue A] Terms Relating to Whether Depth Data is Obtained Independently of Color Data**

3Shape's first argument is that many of the claim terms purportedly require that depth data is obtained "independently" of color data. 3Shape's construction is based on a fundamental misinterpretation of the Color Scanning Patents, which relate not to "independently" obtaining depth and color information but to techniques for capturing depth and color information via sub-scans and processing that information to create a three-dimensional color image. Tellingly, 3Shape identifies nothing in the claim language that requires independent acquisition of depth and color data. Nor do the specifications of the Color Scanning Patents (which are substantially identical) support 3Shape's proposed construction. Instead, 3Shape relies primarily on two cherry-picked, out-of-context statements from the prosecution of different patents to argue disclaimer. But Align's statements related to features not present in the claims asserted here. The Court should read the claims according to their plain meaning, which allows for non-independent depth and color capture.

1.   **The Plain Language of the Claims and Specification Do Not Support 3Shape's "Independently" Construction**

When "the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges," claim construction will involve "little more than the application of the widely accepted meaning of commonly understood words." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1314 (Fed. Cir. 2005), *cert. denied*, 456 U.S. 1170 (2006). Here, none of the Issue A claim terms 3Shape identifies require, by their plain and ordinary meaning, that depth data and color data are obtained independently. Indeed, terms such as "depth data" (A.1), "color data" (A.5), "scanning system" (A.2), "imaging system" (A.3), and "image gathering member" (A.4), say nothing at all about whether the depth data and color data are obtained independently.

3Shape argues that the '519 patent uses the terms "scanning system" (for gathering "depth data") and "imaging system" (for gathering "color image data") as "two distinct systems" in claim 1,

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which 3Shape contends supports its argument that "the 3D surface points are obtained independently of the color data." (3Shape Br. at 6.) But nothing in the language of claim 1 of the '519 patent requires that these systems be "distinct" or "independent." (Ex. A, Hesselink Resp. Decl. ¶ 14.) The Court should not construe these two systems to operate independently when the claim language does not require it. *See Linear Tech. Corp v. Int'l Trade Comm'n*, 566 F.3d 1049, 1055–56 (Fed. Cir. 2009) (holding that the claim terms "second circuit" and "third circuit" did "not require entirely separate and distinct circuits" and need "only perform their stated functions").

In fact, dependent claims in the '519 patent make clear that the "scanning system" and "imaging system" of claims 1, 13, and 24 need not be independent of each other. Dependent claims 2, 14, and 25 explicitly claim systems and methods wherein the "color image data" is obtained "independently" of the depth data. For example, claim 2 requires "[t]he system according to claim 1, wherein the imaging system is configured to provide the tow[sic]-dimensional color image data **independently** from the depth data." ('519 patent at 27:16–18 (emphasis added); *see also id*, claims 14 and 25.) Were the "scanning system" and "imaging system" necessarily independent, these dependent claims would be rendered superfluous. Thus, 3Shape's interpretation is contrary to the doctrine of claim differentiation.

Nor does the specification of the Color Scanning Patents support 3Shape's attempts to import an "independent" limitation into the claims. The specification includes embodiments where the scanning system for depth data and the imaging system for color data share components within the device and thus do not operate "independently." For example, in the first and second embodiments, the specification notes that "a red laser may be used as the illumination source for the main optics when creating the 3D entity[,]" and also "to obtain the red monochromatic image for the creation of the 2D color image[.]" (*See, e.g.,* '433 patent at 18:41–47.) The specification thus explains that because the red laser is used to obtain both depth data and partial information for the

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two-dimensional color image, "only the remaining two colors, green and blue[,]" then need to be

used to be provided for color acquisition. (*Id.* at 18:47-50.) In these embodiments, the patent

specifically contemplates captured image data (from the red laser) being used for generating both

depth data and color image data. (Ex. A, Hesselink Resp. Decl. ¶ 19.)

3Shape improperly relies on individual embodiments in the patent, and general statements

about the state of the art in the "Background of the Invention," seeking to import limitations that

are not supported by—and, as explained above, are often contradicted by—the actual language of

the claims and specification of the Color Scanning Patents. (3Shape Br. at 6.) This is improper. *See*

Liebel-Flarsheim Co. v. Medrad, Inc., 358 F.3d 898, 906 (Fed. Cir. 2004) (even in instances where a

patent describes a single embodiment, the claims are not limited to that embodiment).

2. Align Did Not Clearly and Unambiguously Limit the Asserted Claims to Acquiring Depth and Color Information "Independently" During Prosecution of Different Patents

Lacking support in the claim language or specification, 3Shape's main argument is that Align

purportedly limited the scope of the asserted patents through statements it made during the

prosecution of other, non-asserted patents in the Color Scanning family.

The doctrine of prosecution disclaimer is exacting and requires a "clear and unmistakable"

disavowal. *See Mass. Inst. of Tech. v. Shire Pharm., Inc.*, 839 F.3d 1111, 1119 (Fed. Cir. 2016) ("Where

the alleged disavowal is ambiguous, or even 'amenable to multiple reasonable interpretations,'"

prosecution disclaimer does not apply (*citing Avid Tech., Inc. v. Harmonic, Inc.*, 812 F.3d 1040, 1045

(Fed. Cir. 2016)). And although prosecution disclaimer can theoretically apply across family

members of a patent family, such application is not appropriate where the asserted disclaimer is

directed at claim terms that are distinct from the ones asserted. *Oyster Optics, LLC v. Coriant Am. Inc.*,

No. 2:16-cv-01302-JRG, 2018 WL 7019353, at *3 (E.D. Tex. Mar. 2, 2018) (refusing to apply

disclaimer to children in the family where "the disclaimer [in the parent application] was directed

solely at the claim at issue [in the parent application] and, notably, without comment as to any broader applicability the amendment might have beyond the specific claim and patent"). 3Shape relies on statements Align made during the prosecutions of U.S. Patent Nos. 7,511,829 (the '829 patent) and 10,924,720 (the '720 patent). Neither constitutes a "clear and unmistakable" narrowing of the invention to a system that generates depth and color data independently.

In the '829 prosecution, Align's statement about obtaining depth data "independently" of color data did not relate to how "depth data" is obtained nor did the statement relate to any of the other nine claim terms 3Shape identifies under Issue A. In fact, the claim language for which Align was distinguishing the prior art reference (Mueller) differed in important ways from the claims at issue here. The independent claim at issue in the '829 prosecution was amended to require a "processing means for associating said color data with said depth data for corresponding data points of said reference array." (3Shape Ex. 12 at 2.) Align's statement, therefore, related to how the apparatus processed depth and color image data after it was obtained. It was this "processing means" term that the Examiner found Mueller failed to disclose because Mueller "us[es] the color information from a series of two dimensional color images to derive the three dimensional location in space of the surface point which produced the color images." (3Shape Ex. 13 at 2–3.) Neither Align's statements about Mueller nor the Examiner's finding were about any of the claim terms at issue here.

3Shape also relies on an ALJ's finding in an ITC proceeding that these statements during the '829 prosecution limited the claim scope of another patent in the Color Scanning family (the '538 patent). (3Shape Br. at 5, citing 1144 ITC proceeding.) Of course, this Court will come to its own conclusion about whether prosecution disclaimer applies here, as the ALJ's claim construction is not binding. *Tex. Instruments Inc. v. Cypress Semiconductor Corp.*, 90 F.3d 1558, 1569 (Fed. Cir. 1996). But respectfully, the ALJ's decision in the ITC proceeding 3Shape references was incorrect. Another

ALJ faced with the same arguments in an earlier ITC proceeding flatly rejected that Align had

disclaimed claim scope during the '829 prosecution, noting "[i]t is apparent from the prosecution

history that the applicant distinguished Mueller, but it is not clear that the distinction was based on

the separate collection of depth and 2D color image data." (Ex. B, ITC-1091 Initial Determination

at 37.) The Commission affirmed that finding. (Ex. C, ITC-1091 Commission Opinion at 44–45.)

 3Shape's attempt to construe Align's statement during the prosecution of the '720 patent

(Application No. 15/175,267) as narrowing the scope of the asserted Color Scanning patents

similarly fails. 3Shape cites a single statement from the '720 prosecution to suggest that Align

distinguished prior art (Decker) by narrowing the entire subject matter claimed in that prosecution

to independently obtained depth and color data. That is not accurate. In the '720 prosecution, the

examiner cited Decker as a secondary reference and the basis for a non-final rejection of a claim

addressed to the time interval between the capture of depth data and color data, stating that Decker

discloses an imaging device "wherein a time interval between capture of the depth image data and

the color image data is within an interval between about 0 to about 100 milliseconds." (Ex. D, April

18, 2019 Non-Final Rejection at 8.) In response, Align argued that the Examiner was mistaken, and

that Decker instead disclosed "the length of a single snapshot for acquiring a single type of data

(surface data)[.]" (3Shape Ex. 15 at 9.) Align's arguments, and the Examiner's finding, were directed

at whether Decker disclosed a time interval between gathering depth and color data—which was

relevant to a claim directed toward that time interval—*not* at whether Decker disclosed

independently deriving depth and image data. As in the '829 prosecution, Align never took a "clear

and unmistakable" position in the '720 prosecution about the scope of the claim terms at issue here.

 Verizon Services Corp. v. Vonage Holdings Corp., 503 F.3d 1295 (Fed. Cir. 2007), which 3Shape

relies on, is inapposite. (3Shape Br. at 5.) There, during prosecution of a family member to the

patent-in-suit, the patent holder had distinguished prior art "directed to *non*-localized systems,"

noting that the "present invention," in contrast, was "restricted to operat[ing] within a few feet from

a base station[.]" *Id.* at 1307 (emphasis added). The Court found the patent holder's statements

"clearly disclaimed coverage of systems operating within a range greater than a 'few feet'" in

connection with the construction of the claim term "local wireless gateway systems." *Id.* Here, Align

made no such statements relating to the claim terms at issue, or the invention as a whole. In short,

Align made no "clear and unmistakable" statement restricting the invention to gathering depth data

and color data independently, and it would be improper to construe the claims terms that way now.

3.   Specific Claim Terms

For the reasons explained above, 3Shape's contention that each of the Issue A claim terms

should be construed to require deriving depth data and color/image data independently should be

rejected. Align addresses below the additional construction issues for each of the Issue A terms.

a.   [A.1] "depth data" ('433 Patent 1, 2, 12, 13, 16; '519 Patent 1, 6, 13, 21, 24; '151 Patent 1, 10, 18, 25; '152 Patent 1, 9, 16, 23)

3Shape contends that "depth data" should be construed as "3D surface points." But "depth

data" is a straightforward term for which the jury does not need further construction. *Phillips*, 415

F.3d at 1314–15. "Depth data" is data related to the depth—or three-dimensional properties—of

the scanned object. No further construction is required.[2]

3Shape attempts to import additional limitations, relying on portions of the specification that

refer to "surface points" or "surface topology" of an object. (3Shape Br. at 3 (citing '433 patent,

1:38–40, 2:56–58, cl. 1; '519 patent, cl. 1, '151 patent, cl. 1)). Although "depth data" may be used to

determine three-dimensional surface points, the terms are not synonymous. Depth data is obtained

from a depth scan of an object but the same cannot be said of 3D surface points, which may be

generated from a variety of other techniques and data. In addition, "depth data" may include

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[2] Align withdraws its alternative construction of "depth data."

information other than 3D surface points, such as the position of the lens when it is in focus. (*See* '433 patent at 3:19-24 (explaining that "data representative of the topology" of the object will include information about "the position of the respective focal plane").) Finally, "depth data" is not literally a "surface point" on the object; at most, the data, when processed, is *representative* of three-dimensional points on the object.

3Shape's improper attempt to redefine "depth data" as "three-dimensional surface points" should be rejected.

> **b.**   **[A.2] "scanning system configured to provide depth data of (said/the) portion" ('519 Patent, Cls. 1, 13, 24)**

There are no additional disputes regarding Term A.2.

> **c.**   **[A.3] "imaging system configured to provide (two-dimensional) color image data of (said/the) portion" ('519 Patent, Cls. 1, 13, 24)[3]**

3Shape contends that the "imaging system configured to provide (two-dimensional) color image data" should be construed to require an "imaging device that uses colored illumination (*i.e.* white light or sequential red, green, blue illumination)[.]" (3Shape Ex. 1, Term A.3.) 3Shape argues that the claim term excludes "illumination from a source having a single color—*i.e.*, a red laser or LED[.]" (3Shape Br. at 8-9.) 3Shape's construction should be rejected for two reasons.

First, in general an imaging system need not include its own illumination source. For example, a camera used without flash can be considered an "imaging system" that captures images relying solely on ambient light, such as from the sun. (Ex. A, Hesselink Resp. Decl. ¶ 18.) Second, 3Shape improperly attempts to limit the claims to specific color imaging techniques described in the patent. In contrast, the '519 patent states that "any suitable technique may be used for providing the

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[3] Align had provided a conditional means-plus-function construction of these claim terms because 3Shape originally contended the terms are subject to § 112 ¶ 6. (*See* 3Shape Ex. 1, Term A.3.) 3Shape has apparently withdrawn its § 112 ¶ 6 argument, so it will not be addressed here.

color image." ('519 patent at 17:19-22.) As explained above, according to one embodiment, the apparatus could provide certain color information from the "imaging system" through the use of, for example, two colored lights (green and blue), while the remainder of the color information is provided by the "scanning system's" use of a red laser light to provide both depth and certain color information. (*See* '519 patent at 19:9-18; Ex. A, Hesselink Resp. Decl. ¶ 19.) The claims of the '519 patent require that the "imaging system" "provide two-dimensional color image data" but nothing in the claims requires that the "imaging system" provide *all* of the color information.

3Shape's argument that the '433 IPR supports its construction is without merit. 3Shape contends that Align argued during the IPR that "illumination from a source having a single color … is insufficient to generate a 'color' image." (3Shape Br. at 8–9.) But the portion of Align's Patent Owner Response that 3Shape contends constitutes prosecution disclaimer related to a particular claim and limitation that was at issue in the '433 IPR that is not present in the '519 patent terms at issue here. (*See* 3Shape Ex. 20 at 18 (discussing the possibility of using "a single illumination source" for the '433 patent's "Selectively Map" limitation).) Nothing about Align's arguments in the '433 IPR constitute a "clear and unmistakable" disclaimer of using an illumination source with a single color for the "imaging system" claimed in the '519 patent.

d. [A.4] "image gathering member to generate depth data of the structure portion" ('433 Patent, Cls. 1, 12)

3Shape's contention that Term A.4 is subject to § 112 ¶ 6 should be rejected. The disputed term does not use the word "means," so there is a rebuttable presumption that it does not invoke § 112 ¶ 6. *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015). The term "image gathering member," as used in the specific context of claims 1 and 12 of the '433 patent, has a sufficiently definite meaning to a person of ordinary skill as the name of a structure. Although it is not a term of art, the phrase in the context of the broader claims—"an image gathering member to generate depth data of the structure portion corresponding to a two-dimensional reference array

substantially orthogonal to a depth direction"—indicates to a person of ordinary skill that the image gathering member has an imaging system with a plane substantially perpendicular to the optical axis. (Ex. A, Hesselink Resp. Decl. ¶ 26.)

In order to avoid § 112 ¶ 6 treatment, the claim term "image gathering member" need only convey to one knowledgeable in the art a variety of structures encompassed by that phrase. *Personalized Media Commc'ns, LLC v. Int'l Trade Comm'n*, 161 F.3d 696, 705 (Fed. Cir. 1998) ("[N]either the fact that a 'detector' is defined in terms of its function, nor the fact that the term 'detector' does not connote a precise physical structure in the minds of those of skill in the art detracts from the definiteness of structure." (citation omitted)). The term "image gathering member" conveys sufficient structure to be treated as an ordinary claim term and not pursuant to §112 ¶ 6.

Moreover, were § 112 ¶ 6 to apply, 3Shape construes the structure of the image gathering member too narrowly. The specification does not require, for example, the use of a grating or microlens array, that the processor determine the maximum intensity of returned light, or that the scanning system does not acquire color. (Ex. A, Hesselink Resp. Decl. ¶ 29.) Rather, the specification specifically explains that "any suitable confocal imaging arrangement may be used":

> The main optics 41, main illumination source 31, detection optics 60 and image processor 24 are now described with references to FIGS. 4A and 4B which illustrate, by way of a block diagram an embodiment of a system 20 for confocal imaging of a three dimensional structure according to WO 00/08415 assigned to the present assignee, the contents of which are incorporated herein. *Alternatively, any suitable confocal imaging arrangement may be used in the present invention.*

('433 patent at 14:56-64 (emphasis added).) A person of skill in the art would understand that the image gathering member may include systems that would not necessarily use a grating or microlens array. (Ex. A, Hesselink Resp. Decl. ¶ 30.) Similarly, the imaging gathering member need not operate in a telecentric mode or include a processor to determine the maximum intensity of the light returned from illuminated spots at different positions of the telecentric confocal optics. (*Id.* ¶ 31; '433 patent at 15:31–32 ("unit further comprises a confocal optics 42, *typically* operating in a

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telecentric mode" (emphasis added)).) And the image gathering member need not be excluded from gathering color data for the reasons explained above in sections I.A.1 to I.A.2.

e. **[A.5] "color data of the intra-oral structure"/"color image data" ('519 Patent Cls. 1, 6, 13, 24; '151 Patent Cl. 1, 10, 18, 25; '152 Patent Cl. 9)**

The only additional narrow dispute with respect to Term A.5 is whether "color data of the intraoral structure," to the extent it requires construction, should be construed as "data that represents the color of the intraoral structure *captured by the sensor*." (3Shape Ex. 1, Term A.5 (emphasis added).) Align's addition of the phrase "captured by the sensor" appropriately construes the term to reflect the color data captured by the image sensor, which may differ in certain respects from the color of the object, because, for example, the sensor captures fluorescence image data, which is the color data of the object as captured by the image sensor during fluorescent excitation. (Ex. A, Hesselink Resp. Decl. ¶ 22.)

f. **[A.6] "two-dimensional image data"/"two-dimensional (first/second) image data" ('433 Patent Cls. 1, 2, 12, 13)**

The only additional dispute with respect to Term A.6 is whether the term "two-dimensional image data" from the '433 patent should be construed "to generate color." The plain terms of claims 1, 2, 12, and 13 of the '433 patent do not require that the 2D image data generate color. For example, the "two-dimensional image data" could be comprised of any information captured by the image sensor, whether it is visible light or other electromagnetic radiation outside the visible spectrum. (Ex. A, Hesselink Resp. Decl. ¶ 36.) There is no reason to import 3Shape's additional limitation where it is not supported by the plain language of the claims.

g. **[A.7] "depth image data" ('151 Patent Cls. 1, 10, 18, 25; '152 Patent Cl. 9)**

Finally, 3Shape contends that the last of the Issue A terms—"depth image data"—is indefinite because the specification uses only the term "depth data," and does not specifically define

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the term "depth image data." (*See* 3Shape Br. at 13–14.) There is nothing indefinite about the term

"depth image data." A person of ordinary skill in the art would readily understand the term to refer

to the images recorded by the device from which the system derives the depth data for the color,

three-dimensional numerical entity. (Ex. A, Hesselink Resp. Decl. ¶ 38–39.) For example, claim 1 of

the '151 patent provides:

> capturing **depth image data** and color image data of the intraoral structure from the
> white light illuminating the intraoral structure using an image sensor of an imaging
> device, . . .
>
> generating, using the imaging device and the **depth image data**, depth data of the
> intraoral structure

('151 patent at 26:63–27:4 (emphases added).)

3Shape contends that the skilled artisan would not and could not understand the patent

claim's simultaneous use of the phrases "depth data" and "depth image data." To the contrary, a

person of ordinary skill in the art would readily understand that the term "depth image data" is

distinct from "depth data," in that "depth data" describes the data that reflects the depth of the

object, whereas "depth image data" describes the image data that is used to *derive* the depth data.

(Ex. A, Hesselink Resp. Decl. ¶ 39.) There is no requirement that a claim term have the same

definition across all patents in a family. And Align's expert's off-hand statement, in response to

questioning by 3Shape's counsel during the 1091 ITC investigation, that "depth data" refers to

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████████████████████████ is entirely consistent with the usage of that term in the '151 and

'152 patents. (3Shape Ex. 26 at 546:23–25.)

The term "depth image data" is not indefinite and, as explained above, should be construed

as "the image data used to derive depth data."

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B.   [Issue B] Terms Related to Mapping of Color Data to Depth Data

The "mapping" terms relate generally to the linking of the depth data and the image data. 3Shape attempts to substitute words for the claim terms where they are no easier to understand than the claim terms themselves, in a not-so-transparent attempt to limit the meaning of the terms.

1.   [B.1] "map the estimated image data to the depth data for the two-dimensional reference array" ('433 Patent, Cl. 1)

This is a phrase that does not require interpretation. "Map" is not a term that is difficult for a jury to understand, and there was no disclaimer of its ordinary meaning in the specification. The interpretation proposed by 3Shape is overcomplicated and limiting.

First, 3Shape proposes to construe "map" as "match." "Map" is a "commonly understood word[]" that does not require interpretation. *Phillips*, 415 F.3d at 1314–15. In addition, defining "map" as "match" is overly restrictive because the ordinary meaning includes "link" as well. In fact, 3Shape itself cites Align's statement in an IPR proceeding that the system would "at least match or link the claimed 'two-dimensional image data' to the claimed 'depth data.'" (3Shape Br. 16, citing Ex. 20 at 14.) The specification also explains that "[w]here the X, Y coordinates of the color image *do not precisely correspond* to those of the 3D scan, … suitable interpolation methods may be employed to *map* the color data to the 3D [spatial] data." ('433 patent at 4:25–30 (emphasis added).) In this way, "map[ping]" is broader than exact matches of data.

Moreover, one of the references cited in the '433 patent provides guidance on the meaning of "mapping." A 2001 article entitled "Integrated Three-Dimensional Craniofacial Mapping: Background, Principles, and Perspectives" by Baumrind (cited at '519 patent at page 5, col. 2) describes "mapping" as using at least three "tie points" in the "region of overlap of any pair of 3D maps to be merged." (Ex. E at 230.) That allows for the linking of the images from two sets of coordinates, even though there is not exact "matching" of all coordinates.

Second, 3Shape proposes limiting the claim term to "X-Y coordinates." That restriction is not found in the claims or specification. The claims reference a "two-dimensional image array" but do not require that the coordinates be X and Y. While the specification discusses an embodiment with X-Y coordinates, it also discusses more generally "depth data at a plurality of predetermined spatial coordinates" without limiting to X and Y. ('433 patent at 5:67–69, 6:34–36; 8:13–16, 8:32–35, 8:48–50, 8:54–61) Alternative spatial coordinate systems include cylindrical and polar coordinate systems, in which each point on a plane is determined by a distance from a reference point and an angle from a reference direction. (Ex. A, Hesselink Resp. Decl. ¶ 67.) Therefore, the "two dimensional reference array" in the '433 patent should not be limited to "X-Y coordinates."

2. **[B.2] "selectively map the image data to the depth data for the two-dimensional reference array based on the plurality of focal lengths and the depth data such that the resulting associated color of the structure portion is in focus relative to the structure portion for a plurality of distances in the depth direction" ('433 Patent, Cl. 12)**

Two of the problems with 3Shape's proposed construction are the same as in the prior term. First, "selectively map" should not be limited to "selectively match." The word "map" is broader in scope and includes linking as well was matching. Second, the claim term should not be limited to "X-Y coordinates" as the patent discusses more generally "spatial coordinates."

In addition, 3Shape proposes to limit the reference to "resulting associated color of the structure portion is in focus" to "the entire wavelength composition of color is in focus," based on Align's IPR response. (3Shape Br. 17) 3Shape is overreaching. In the IPR response, Align argued that the claim term is not limited to a "single color component or a single wavelength." (3Shape Ex. 20 at 18.) The PTAB agreed, noting that the "resulting associated color" claim term is not "merely one wavelength component of the color." (3Shape Ex. 27 at 18.) The PTAB noted that the "'associated color' *includes* the entire wavelength composition of light reflected by an object." (*Id.* at 22 (emphasis added).) But the fact that it "includes" the entire wavelength does not mean that it

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must. In the concluding portion of the PTAB decision on this issue (not attached by 3Shape), the

PTAB noted that "the light reflected by the object would not be limited to a single color component

or a single wavelength, but would instead include at least some light at each wavelength component

of the illumination." (Ex. F, Final Written Decision at 24 (citations omitted).) There is a considerable

difference between "some light at each wavelength component of the illumination" (what the PTAB

said) and "the entire wavelength composition of color" (what 3Shape proposes). 3Shape's

construction does not accurately reflect the statements in the IPR and should be rejected.

3.   **[B.3] "processor...configured to associate the depth data with the two-dimensional color image data" ('519 Patent, Cls. 1, 13)**

This claim limitation (from the '519 patent) differs from the prior two '433 patent claim

terms in that it uses the term "associate," instead of "map." 3Shape proposes to construe both as

"match." But "associate" is broader than "map." "Associate" is defined as "to join or connect

together." (Ex. G, Merriam Webster's Collegiate Dictionary (11th Ed. 2003).) Two things can be

connected without "mapping."

The specification refers to "associate" or "associated" data multiple times. (*E.g.*, '519 patent

at 3:60, 5:14–15, 9:19.) The discussion of specific embodiments frequently refers to "map" or

"mapping." (*Id.* at 14:4–10, 14:42–47, 15:15–20.) The Align statement in the IPR referenced by

3Shape does not equate the two. Align stated that to "*associate* color information with a three-

dimensional object, the '433 Patent discloses that *in one example*, '[t]he processor 24 [may align[] the

2D color image with the 3D entity previously created, and then provide[] color values to this entity

by *mapping* color values to the entity at aligned X-Y points." (3Shape Ex. 29 at 7 (emphases added).)

The word "associate" should not be interpreted the same as "map" since it has a broader ordinary

meaning.

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4.   **[B.4] "(color) three-dimensional numerical entity" ('151 Patent, Cls. 1, 10, 11, 18, 25; '152 Patent, Cls. 1, 9, 23)**

The proper construction of this claim term is a "numerical entity created by associating coordinates of color data to coordinates of depth data." The claim language surrounding this term shows how it is used in its ordinary sense to refer generally to what is created by associating color data and depth data. Each of the claims of the '151 patent using this claim term refer to a "color three-dimensional numerical entity *based on* depth data and the color data." The claims in the '152 patent refer to a "three-dimensional numerical entity *based on* the depth data and the color data" (claim 1), "*combining* the depth data and the color data to create a three-dimensional numerical entity" (claim 9) and providing "a color three-dimensional numerical entity *comprising* the depth data and the color data…" (claim 23). (Emphases added.)

3Shape seeks to add several different limitations to this straightforward term. First, 3Shape requires that the numerical entity be "new." But there is nothing in the patent that requires either that the numerical entity is "new" or one previously calculated. "New" compared to what?

Second, 3Shape adds that there be a "matching" of coordinates. But the claims of the '151 and '152 patents in which this claim term is used do not use the terms "match" or even "map." They use "associate," which as noted above is broader. Adding a requirement to "match" is improper.

Third, 3Shape seeks to require that the depth data is "independently obtained" from the color data. For reasons noted in Issue A above, that is not required by the Color Scanning Patents. Moreover, the claims of the '152 patent expressly rebut this argument. Claim 23 of the '152 patent, which contains the "color three-dimensional numerical entity" claim term, requires that the "image data used for generating the depth data is also used for the color data of the color three-dimensional numerical entity." When the same image data is used for both color and depth the depth data is not "independently obtained."

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C.   [Issue C] Terms Relating to Light/Light Beams

The claim terms in 3Shape's Issue C relate to the systems for generating the depth data.

3Shape's indefiniteness argument based on claim terms referencing "light" is baseless. A person of

ordinary skill in the art would not have any trouble understanding "light" when used with "array"

and "plurality" to refer to light beams. And 3Shape's attempt to limit incident light to the illuminated

spot embodiment is improper.

1.   [C.1] "illumination unit configured to transmit a first array of incident light along a path towards the three-dimensional structure" ('519 Patent, Cls. 1, 13, 24)

3Shape raises two issues with this claim term. First, 3Shape argues that the term "array of

incident light" is indefinite because the specification uses the phrase "array of incident light beams."

(3Shape Br. at 19.) The claim term is not indefinite. Rather, a person of ordinary skill in the art

would understand "array of incident light" to refer to the "array of incident light beams" discussed

in the specification.

"Incident light" is direct light that falls on a surface. (Ex. H, McGraw Hill Dictionary of

Scientific and Technical Terms (6th Ed. 2003); Ex. A, Hesselink Resp. Decl. ¶ 46.) Incident light can

include diffuse light, such as light from a light bulb, as well as light beams. (Ex. A, Hesselink Resp.

Decl. ¶ 46.) The ordinary meaning of "array" is a number (of items). Because the claim term is an

"array of incident light," a person of ordinary skill in the art would understand with reasonable

certainty that this is referring to a number of incident light beams rather than diffuse light.[4] (*Id.* ¶ 49.)

3Shape notes that the specification refers to an "array of light beams" and certain claims dependent

on the claim requiring an "array of light" refer to "the light beams." (3Shape Br. at 20.) The use of

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[4] 3Shape's statements that light beams are "collimated light" and that "uncollimated light … cannot form an array" are misleading. A light beam (including laser and LED) may or may not be collimated. (Ex. A, Hesselink Resp. Decl. ¶ 47.)

slightly different terms to express the same concept does not render the term indefinite. "[I]t is not unknown for different words to be used to express similar concepts, even though it may be poor drafting practice." *Bancorp Servs., L.L.C. v. Hartford Life Ins. Co.*, 359 F.3d 1367, 1373 (Fed. Cir. 2004) (claim term not indefinite); *see also Team Worldwide Corp. v. Wal-Mart Stores, Inc.*, No. 2:17-cv-00235-JRG, 2018 WL 1353116, at *11 (E.D. Tex. Mar. 15, 2018). There is no reason to construe the phrase "array of incident light" as it has a plain and ordinary meaning.[5]

Second, 3Shape argues that "illumination unit" is subject to §112 ¶ 6 because "unit" is a nonce word. That is incorrect. The reference to "illumination" provides sufficient structure that a person of ordinary skill in the art would understand the meaning of the "illumination unit" as "one or more optical elements that provide or condition light for illumination."

Since the disputed term does not use the word "means," there is a rebuttable presumption that it does not invoke § 112 ¶ 6. *Williamson*, 792 F.3d at 1348. "There is nothing about the use of the word 'unit' that automatically subjects a claim term to means-plus-function treatment." *U.S. Well Servs., LLC v. Tops Well Servs.*, No. 3:19-cv-00237, 2020 WL 9439469, at *24 (E.D. Tex. Sept. 18, 2020) (finding that "centralized control unit" is not subject to Section 112, ¶ 6); *see also Samsung Elecs. Am., Inc. v. Prisua Eng'g Corp.*, 948 F.3d 1342, 1354 (Fed. Cir. 2020) ("digital processing unit" not a means-plus function term); *Maxell Ltd. v. Huawei Device USA Inc.*, 297 F. Supp. 3d 668, 733 (E.D. Tex. 2018) ("display unit" not a means-plus-function term); *St. Clair Intellectual Prop. Consultants, Inc. v. Matsushita Elec. Indus. Co.*, 691 F. Supp. 2d 538, 557-58 (D. Del. 2010) ("image pick-up unit" not a means-plus-function term).

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[5] 3Shape's alternative construction of the phrase is "light incident on an object to form an array of spots." 3Shape does not argue for that interpretation in its brief. It makes its arguments attempting to limit the claims to illumination spots in the context of the phrase "incident light beams" below (Issue C.3). Align will address 3Shape's argument there.

Here, the reference to "illumination" provides sufficient structure. (Ex. A, Hesselink Resp. Decl. ¶ 43.) An "illumination unit" is a source that provides or conditions light for illumination, which can also include optical elements, such as lenses, filters, shutters, beam shaping optics. (*Id.*)

If "illumination unit" is considered to be subject to § 112 ¶ 6, then 3Shape's proposed structure is much too narrow. 3Shape attempts to limit the "illumination unit" to "laser(s) optically coupled to a grating or microlens array." But the structure in the specification is not limited to lasers and can include various light emitters. In discussing the "main illumination source 31," the specification refers to "confocal imaging of a three dimensional structure according to WO 00/08415 assigned to the present assignee, the contents of which are incorporated herein." ('519 patent at 15:21–29.) 3Shape agrees that the '415 reference has the "same confocal imaging system described in the Color Scanning Patents." (3Shape Br. at 24.) "[A] patent publication incorporated by reference can provide supporting structure for means-plus-function claiming." *Arterbury v. Odessa Separator, Inc.*, No. 5:16-cv-00183-RWS-RSP, 2018 WL 4027026, at *11 (E.D. Tex. Aug. 23, 2018).[6] The patents from that earlier family are the subject of a separate lawsuit in Delaware (17-cv-1648). In that lawsuit, 3Shape agreed that the "illumination unit configured to generate a plurality of incident light beams" had a structure of "(1) one or more light emitter(s), semiconductor laser(s), or laser emitter(s) in conjunction with diffraction or refraction optics, grating, microlens array, or an optics expander; or (2) a plurality of light emitters, semiconductor lasers, or laser emitters…; or (3) equivalents thereof." (Ex. I, Delaware 1648 Joint Claim Construction Chart at 20; Ex. J, '415

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[6] The *Arterbury* court noted that 37 CFR § 1.57(d) "expressly permits 'essential material' for a patent specification to be incorporated by reference—such as 'the structure, material, or acts that correspond to a claimed means or step for performing a specified function as required by 35 U.S.C. 112(f).'" *Arterbury*, 2018 WL 4027026, at *11. In *Otto Bock Healthcare LP v. Össur HF & Össur Ams., Inc.*, 557 F. App'x 950, 955 (Fed. Cir. 2014), the Federal Circuit distinguished its earlier decision in *Atmel Corp. v. Info Storage Devices*, 198 F.3d 1374 (Fed. Cir. 1999), stating that "*Atmel* only foreclosed the use of the content of a non-patent publication incorporated by reference to add structure to a means-plus-function claim. *Atmel* did not purport to include U.S. patent applications."

reference at 6:3–8, 8:23–9:3, and 14:9–12.) If the claim limitation is found to be within § 112 ¶ 6, that same structure is applicable here.

2.   [C.2] "detector (configured) to measure intensity of each of a plurality of returned light"/"measure intensity"/"returning light" ('519 Patent Cls. 1, 4, 13, 24, 30; '151 Patent Cls. 10, 25)

As with "array of incident light," 3Shape argues that "each of a plurality of returned light" is indefinite because it does not contain the word "beam." (3Shape Br. at 21–22.) A person of ordinary skill in the art would understand "each of a plurality of returned light" to refer to a plurality of returned light beams because of the reference to "plurality." (Ex. A, Hesselink Resp. Decl. ¶ 52.) A person of ordinary skill in the art would not find the reference to "returned light" instead of "returned light beams" (the term used in the specification) to be so confusing that a reasonably certain understanding was impossible.[7] (*Id.*)

3Shape also argues that "detector" is indefinite because it does not "provide any context" as to how it functions. (3Shape Br. at 22.) That is incorrect. Claim 1 of the '519 patent requires "a detector configured to measure intensity of each of a plurality of returned light that returns along the path." That explains precisely what the detector does. (Ex. A, Hesselink Resp. Decl. ¶¶ 53–54.)

3Shape's alternative construction proposing to limit the detector to "measure intensity of light returned from each illuminated spot that returns along the path and form the three dimensional structure" is an improper attempt to limit the claim to the "illuminated spot" embodiment of the specification (more on this in the next section). There was no "clear and unmistakable disclaimer" that limits the scope of the claim term to only detection of light from illuminated spots. *See Thorner v. Sony Comput. Entm't Am. LLC*, 669 F.3d 1362, 1367-68 (Fed. Cir. 2012). 3Shape's proposed

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[7] 3Shape's alternative construction of this phrase as referring to "light returned from each illuminated spot" is an improper attempt to import an embodiment into the claim, as discussed in detail in the next section on Term C.3.

construction is also incorrect based on the doctrine of claim differentiation. The '519 patent includes dependent claims requiring that the detector "measure intensity of each of a plurality of returned light beams originating from the illuminated spots." (Claims 10, 23) 3Shape's attempt to include this language in the construction of "detector" would render these dependent claims superfluous.

3.   [C.3] "light beams"/"incident light beams"/"returned light beams" ('519 Patent Cls. 20, 21; '151 Patent Cls. 1, 18)

There is apparent agreement on "light beams" and "returned light beams." On light beams, the only question is the phrasing of the plural phrase "light beams"—whether as "directional projections of light energy" (Align) or "more than one directional projection of light energy" (3Shape). Align's proposed construction is simpler and easier to follow. On "returned light beams," the parties have the exact same proposed construction: "light beams returned in response to the incident light beams on the three dimensional structure/dentition." (3Shape Ex. 1, Term C.3.)

The issue is how to define "incident light beams," which is used in claim 18 of the '151 patent as well as within the proposed construction of "returned light beams." Claim 18 refers to "incident light beams from the white light illuminator…" Align proposes the straightforward construction of "incident light beams" as "directional projections of light energy propagating along the optical axis illuminating an object." This is what claim 18 refers to—light beams from the "white light illuminator" that illuminate the object. That is consistent with the definition of "incident," which is "falling or striking on something" especially when used with light rays. (Ex. G, Merriam-Webster's Collegiate Dictionary (11th Ed. (2003).) This is also how the phrase is used in the specification. For instance, the '151 specification refers to a light beam which passes through a module that "splits the parent light beam 30 into a plurality of incident light beams 36, represented here, for ease of illustration, by a single line." ('151 patent at 15:32–34.)

3Shape attempts to improperly limit the "incident light beams" to "light beams that form illuminated spots on the surface of the object." 3Shape's stated reason for this limitation—that the

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specification does not describe the light beams "as forming or being returned from anything else other than an illuminated spot"—is a classic example of importing a limitation from the specification into the claim, violating one of the most fundamental canons of claim construction. "Even when the specification describes only a single embodiment, the claims of the patent will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using words or expressions of manifest exclusion or restriction." *Liebel-Flarsheim*, 358 F.3d at 906 (citation and quotation omitted).

There is no statement in the '151 or '519 patents that limits the scope of the invention to "incident light beams" that illuminate spots. Rather, in discussing the obtaining of the "3D surface topology," the specification explains that it is "*preferably* carried out using [a] confocal focusing method" that uses spot specific positions. ('519 patent at 3:14–16 (emphasis added).) But the specification notes that it is not limited to that embodiment:

> While the present invention has been described in the context of a particular embodiment of an optical scanner that uses confocal focusing techniques for obtaining the 3D entity, **the device may comprise any other confocal focusing arrangement**, for example as described in WO 00/08415. In fact, any suitable means for providing 3D scanning can be used so long as the 3D scan and the color 2D scan correspond substantially to the same object or portion thereof being scanned, and the same frames of references are maintained.

(*Id.* at 26:8–17 (emphasis added).)

3Shape similarly attempted to limit light beams to those that "either generate or propagate from a plurality of illuminated spots" in the Delaware 1648 case discussed above. 3Shape agrees the Delaware patents have the "same confocal imaging system described in the Color Scanning Patents." (3Shape Br. at 24.) The Delaware court rejected 3Shape's argument because the specification's description of the embodiment does not rise to "the level of a 'clear and unmistakable disclaimer' that limits the scope of 'light beams' to only those that 'generate or propagate from a plurality of illuminated spots.'" (Ex. K, Delaware 1648 Markman Opinion at 6–7.) The same should apply here.

An embodiment in which light beams illuminate spots does not limit the invention, and the specification itself notes that the invention is not limited to that particular embodiment.

Further, the doctrine of claim differentiation is applicable. In the '519 patent, independent claim 1 recites an illumination unit that transmits "a first array of incident light" and a detector that measures intensity of "each of a plurality of returned light." ('519 patent at 27:6–10.) Dependent claim 10 adds, among other things, that the illumination unit transmits a "first array of light beams" that generates "illuminated spots on the portion of the structure" and the detector detects those spots and the processor uses the "spot specific position." (*Id.* at 27:64–28:23; *see also id.* at claims 13 and 23 (adding a "spot specific position").) 3Shape's proposed construction seeking to limit the "incident light" to illuminating spots would render these dependent claims superfluous.

D.   [Issue D] Terms Relating to Focusing

1.   [D.1] "focal plane" ('151 Patent Cls. 1, 10, 18; '152 Patent Cls. 1, 9, 16, 23)

3Shape cites a Federal Circuit case for the proposition that "unless otherwise compelled … the same claim term in the same patent or related patents carries that same construed meaning." (3Shape Br. at 24–25 (citation omitted).) What 3Shape fails to mention is the Delaware court interpreted this exact phrase, "focal plane," in the 1648 case as used in the patents from the family whose specification was incorporated by reference into the Color Scanning Patents at issue here. The Delaware court rejected 3Shape's arguments that "focal plane" should be construed as "flat." Instead, it construed "focal plane" to be "a position where one or more light beams from the optical system are focused." (Ex. K, Delaware 1648 Markman Opinion at 21.) That is also the construction that 3Shape previously agreed to in ITC proceedings. (Ex. L, ITC-1090 Markman Order at 15.) That is the construction offered by Align here.

3Shape's proposed construction of an "X-Y plane parallel to the image sensor" is merely different phrasing of what it could not obtain in the Delaware case—"parallel to the image sensor"

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means "flat." (Ex. A, Hesselink Resp. Decl. ¶ 58.) 3Shape concedes this, noting that a "flat" surface

on the optics means that "the focal plane is parallel to the image sensor." (3Shape Br. at 24.)

3Shape criticizes Align's proposed construction because it "removes the term 'plane' from

the claims." (3Shape Br. at 25.) 3Shape's reliance on the meaning of the phrase "plane" in geometry

is not applicable. A POSITA would rely on the understanding of the entire phrase "focal plane," and

would not separate out "focal" and "plane." (Ex. A, Hesselink Resp. Decl. ¶ 60; Ex. K, Delaware

1648 Markman Opinion at 22.) It was well-known in the field that a focal plane will rarely if ever

form a flat surface.[8] (Ex. A, Hesselink Resp. Decl. ¶¶ 60, 64) 3Shape's own engineers agree, noting

that it is ███████████████████████ (Ex. M, June 25, 2018 Christiansen Dep. at

57:10–20.)

3Shape's criticism that a "point cannot be parallel to a plane" is misleading. (3Shape Br. at

25.) Align's proposed construction (adopted by the Delaware court) refers to a "position," not a

"point." That is consistent with the specification, which states that "the focusing optics defining one

or more *focal planes* forward said probing face in a *position* changeable by said optics…" ('151 patent

at 3:19–21(emphasis added).) In addition, even in discussing the illuminated spot embodiment that

3Shape references, the specification states that "[t]he position of each spot in an X-Y frame of

reference is known and by knowing the relative *positions of the focal plane* needed in order to obtain

maximum intensity…" (*Id.* at 3:52–54.) Finally, in discussing this embodiment, the specification

notes that the X-Y plane is "substantially parallel" to "the sensing face of the image sensing means

of the detection optics 60, typically a CCD." (*Id.* at 14:7–10.) That means that there is some

curvature. (Ex. A, Hesselink Resp. Decl. ¶ 65.) It is not the same as being flat or strictly parallel.

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[8] 3Shape's reliance on an expert declaration in an IPR petition on the '228 patent is misplaced. The expert simply opined on whether the confocal system of the '415 reference was different than the confocal system of an Okamoto reference. (3Shape Ex. 30 ¶ 187.) He testified, consistent with other experts, that "all lenses suffer from the aberration 'field curvature.'" (*Id.* ¶183.)

3Shape argues that "[l]ater-filed Align patents" that describe imaging of "non-parallel focal surfaces (e.g., curved focal surfaces)" as if any reference to "focal plane" before those patents could not include non-parallel (non-flat) focal surfaces. (3Shape Br. at 24.) But even 3Shape has defined the optical term "focus plane" in its own patents as including a non-flat surface: "The focus plane does not need to be flat. It may be a curved surface." (Ex. N, U.S. Patent No. 10,349,042 at 5:4–7.)

2.   **[D.2] "focusing optics" ('151 Patent Cls. 1, 10, 18, 25; '152 Patent Cls. 1, 9, 16, 23)**

No construction of the phrase "focusing optics" is necessary as there is a plain and ordinary meaning—"one or more optical components that focus light beams to one or more focal planes." That is the construction offered by Align and accepted by the Delaware court in the 1648 case. (Ex. K, Delaware 1648 Markman Opinion at 16.)

3Shape attempts to add two restrictions in its construction based on the preferred embodiment. First, 3Shape proposes to limit the "focusing optics" to those "operating telecentrically." But the '151 specification says: "Typically, the focusing optics operates in a telecentric confocal mode." ('151 patent at 6:28–29; 15:55–56.) Use of the word "typically" confirms that the language is "not a limitation." *Honeywell Int'l, Inc. v. Nikon Corp.*, 589 F. Supp. 2d 433, 450–51 (D. Del. 2008); see *Iscar Ltd. v. Sandvik AB*, No. 99-1577, 2000 WL 1225457, at *4 (Fed. Cir. Aug. 25, 2000) (patentee's use of the term "typically" in noting that "grinding is 'typically' used in the fabrication of the [claimed] inserts" did not limit the claims to grinding); *Aguayo v. Universal Instruments Corp.*, 356 F. Supp. 2d 699, 722 n.49 (S.D. Tex. 2005) (refusing to read a limitation into the claim from the specification because the "patentees prefaced both descriptions with the word 'typically' and did not use words of exclusion or restriction").

3Shape's reliance on the declaration of Dr. Sonka in an IPR proceeding is clearly inapplicable. There, in the paragraph quoted by 3Shape, Dr. Sonka referred to "focusing optics (e.g., telecentric-main confocal optics 42)" from a figure in the earlier Babayoff '415 reference. (3Shape

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Ex. 28 ¶135.) "E.g." simply means "for example." As with "typically," the use of an example does not restrict the meaning of the term "focusing optics."

The fact that there are later Align patents that relate to a particular way to correct for distortion from non-telecentric lenses does not mean that the '151 patent is limited to only telecentric lenses, as 3Shape suggests. (3Shape Br. at 25.) Standard image processing techniques could be used to account for distance-induced constant magnification errors, including lookup tables. (Ex. A, Hesselink Resp. Decl. ¶ 32.) Finally, for the reasons discussed above with respect to Term D.1, 3Shape's attempts to restrict "focusing optics" to a "focal surface parallel to the image sensor," (3Shape Br. at 25), are improper.

> ### E.   [Issue E] Terms Relating to Reference Array

The only dispute between the parties regarding the terms related to Issue E is whether the terms "two-dimensional reference array" ('433 patent claims 1, 12) and "a plurality of data points defined on a plane" ('519 patent claims 1, 13, 24) are limited to an array and plurality "of points in an X-Y plane." (*See* 3Shape Ex. 1 at 8.) As explained above with respect to Term B.1, there is no restriction in the claims or the invention that requires that the reference array or data points on a plane be limited to points on an X-Y plane. A construction of the terms "two-dimensional reference array" and "a plurality of data points defined on a plane," should allow for the possibility, for example, that the data points are cylindrical or polar coordinates, which is a type of "spatial coordinates" as used in the specification. (Ex. 1, Hesselink Resp. Decl. ¶ 67.)

II.   SELECTIVE RESCANNING PATENTS

The Selective Rescanning patents genrally address the situation where some portion of an original scan is unusable in the model of the patient's teeth—for example, because some portion of the image is obscured. ('936 patent at 1:50–2:12.) Rather than throw out the whole model and start over, the patents describe how a second scan can be taken and used instead of the unusable portion.

(*Id.* at 2:13–22.) The terms at issue are discussed in depth below, but at a general level, concern (i) what happens to the part of the old scan that is unusable; (ii) what has changed between the first scan and the second scan; and (iii) how a user indicates what part of the old scan will be rescanned.

A.   [Issue F] Deleting, Removing, or Discarding Portions of a Model

1.   "remove, from the displayed model, a removed surface portion of the model to be removed according to the user input ('936 Patent, Cls. 1, 17)

This term concerns what happens when the unusable portion is "remove[d]." 3Shape says only one thing can happen—the unusable portion is "deleted." But the claims and specification say otherwise.

As a matter of plain English, to "delete" is to "remove" *permanently*, especially in the context of computer science. (Ex. O, Oxford Dictionary of Computer Science (7th Ed. 2016) ("delete: 1. [t]o remove or obliterate a record or item of data, such as by overwriting data on disk or tape with new data or null characters; 2. To remove permanently an object, such as a character, work, paragraph, or graphic, from a document, or to remove an entire document file from permanent storage.").) "Removal" is broader than "deletion," encompassing circumstances ranging from simple movement to elimination. (Ex. G, Merriam Webster's Collegiate Dictionary.) This distinction squares with these terms are used in real life. As any writer in the modern age knows, "cut and paste" does not mean "delete and paste" even though the selected text is "removed" in both instances. "Cut" text is still available even though it is "removed." But it is not "deleted," discarded, or "remove[d] permanently." Otherwise, how could it be pasted?

The claims reflect this distinction. Claim 17 requires both "removing" the unusable portion of the scan and then "discarding" that unusable portion—an action indistinguishable from deletion. ('936 patent at 32:41–46.) But under 3Shape's read, the reference to "discarding" would be surplusage. The "removed" data would necessarily already be "deleted," so there would be nothing

to "discard." (*Id.*) Dependent claims maintain the same distinction between removal and discarding. (*Id.* at 30:37–39 (independent claim: "remove"), 31:10–16 (dependent claim: "discard").) This is reason enough to reject 3Shape's construction. *Elekta Instrument S.A. v. O.U.R. Sci. Int'l, Inc.*, 214 F.3d 1302, 1307 (Fed. Cir. 2000) (rejecting construction that would render limitation "superfluous").

The specification provides more reasons. "Delete," "remove," and "replace" are each discussed as separate "computer-implemented function(s)" throughout the specification. These functions can each be used in the same situation—*i.e.*, what happens to an unusable portion of the model when new data is added. ('936 patent at Fig. 1 at 440, Fig. 9 at 460, 4:31–38 ("at least one of delete, remove, and replace . . . by applying a corresponding function (i.e., a delete function, a remove function, or a replace function, respectively)"), 5:3–15 (same), 7:50–58 (same), 8:21–31 (same), 11:4–12 (same), 11:45–50 (same), 13:57–63 ("deleted or removed or replaced"); 14:55–57 ("'deleted' (or otherwise removed)").)

Against the weight of usage showing that "delete," "remove," and "replace" are each separately available actions in the context of the invention, 3Shape's lone specification support for its construction is the following carefully and selectively edited portion of a sentence: "[T]he 'delete' function is 'also referred to interchangeably herein as a remove function, remove command, or deleted command. . . .'"(3Shape Br. at 29 (citing '936 patent at 24:57–59).) But a portion of the sentence from the specification not quoted makes clear that "deletion" is an alternative to "removal" or "replacement": "part . . . of the first virtual model . . . is then 'deleted' or otherwise removed or replaced. . . ." ('936 patent at 24:51–53.) And the clause immediately following 3Shape's gerrymandered quote maintains the distinction. (*Id.* at 24:60-63 ("i.e., when a corresponding function (delete function or remove function or replace function) is applied").) Further, the specification explains that it uses "delete" for "ease of reference" when referring to "special computer-implemented function(s)" such as delete, remove, and replace. (*Id.* at 21:40–44.) 3Shape's quoted

clause does not show an "express intent" to displace the specification's clear distinction among alternative (or "interchangeable") "delete," "remove," or "replace" functions. *See Elekta Instrument*, 214 F.3d at 1307.

Finally, 3Shape says that "delete" is understandable to a jury whereas "remove" is confusing. But if "delete" is understood in the art, as 3Shape agrees, then a person of ordinary skill would read the specification's use of the disjunctive "delete," "remove," or "replace" functions to connote different things.[9] The person of ordinary skill would thus not read "remove" to mean "delete," nor is "remove" is a confusing term. "These are ordinary, simple English words whose meaning is clear and unquestionable." *Chef Am., Inc. v. Lamb-Weston, Inc.*, 358 F.3d 1371, 1373 (Fed. Cir. 2004).

B. [Issue G] The Scope of a Physically Changed Intraoral Portion

1. [G.1] "a physically changed portion of the patient's intraoral cavity" ('936 Patent, Cls. 1, 9)

There is no dispute that in the course of conducting a scan, things like food, blood, or debris can get in the way and obscure portions of the mouth, requiring the dental practitioner to take a new scan of the obscured portion. The only dispute is whether the "dental practitioner" has to be the one actually removing whatever is obstructing part of the mouth in the first image. If a patient's tongue obscures an image and the patient moves her tongue, 3Shape would presumably say the claim is not infringed. But if the dental assistant moves the patient's tongue, then 3Shape would presumably agree the limitation is met. 3Shape asks the Court to import this curious dividing line between infringement and non-infringement based on an over-reading of the passive voice, by making examples conclusive of claim scope, and by taking an ostrich's view of specification language that is inconsistent with its theory. The Court should decline 3Shape's invitation.

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[9] Dr. Mellor's opinions on these terms consist of just reading the specification and saying he agrees with 3Shape, without elaboration or even citation. (3Shape Ex. 36 at ¶¶ 18–19.)

At the outset, 3Shape's proposed construction imports limitations that are missing entirely from the claims and the specification. The '609 patent's claims do not include the words "dental practitioner," let alone ascribe agency to one. The only actor that the claims require is a "user" to provide "user input," which is not at issue here. ('609 patent at 30:50–53.) If the inventor had meant to limit his invention to actions by specific individuals, he knew how to do so.

The specification provides further support that the inventor did not mean to limit the invention to actions by the dental practitioner. Obscuring materials do not have to be the result of actions by the dental practitioner or even related to work performed by the dental practitioner. ('609 patent at 5:57–63 ("For example, said first portion of said first physical part was obscured with a material including one or more of saliva, debris, blood. . . .").) The specification is explicit that a portion of the mouth can be obscured by work performed or other things, "additionally or alternatively" including blood, saliva, or the patient's tongue. ('609 patent at 1:64–2:9, 15:3–10.)

3Shape's support for its proposed construction is illogical. 3Shape first argues that the use of the passive voice by the Examiner during patent prosecution means that the Court should read-in "dental practitioner" as the actor. But saying that "intraoral modifications are made" or that an "intra-oral cavity . . . is modified" does not mean that the dental practitioner must be "making" or "modifying." This is the textbook difference between active and passive voice. If a patient swallows a piece of spinach that had been between his teeth after a scan, "intraoral modifications are made," but not "by the dental practitioner."

3Shape's second approach is to elevate examples during the prosecution of other patents to the level of limitations. But no one disputes that a dental practitioner can physically alter a portion of a patient's mouth—*e.g.*, by "subject[ing] it to a surface preparation" or through "a removal operation . . . on a tooth." The specification includes other examples of obstructions that do not require a

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dental practitioner's involvement to "physically alter" the patient's mouth. ('609 patent at 15:3–10.)

3Shape's attempt to limit the claim to only the alterations by a dental practitioner should be rejected.

2.   **[G.2] "accounting for changes in surface topology when [intraorally] scanning a patient's teeth for a dental procedure" ('609 Patent, Cls. 1, 12, 23)**

This term is taken from the preamble of several claims in the '609 patent. Preambles to claims are generally not limiting. *Arctic Cat Inc. v. GEP Power Prods., Inc.*, 919 F.3d 1320, 1327 (Fed. Cir. 2019). "If the body of the claim sets out the complete invention, and the preamble is not necessary to give 'life, meaning and vitality' to the claim, 'then the preamble is of no significance to claim construction because it cannot be said to constitute or explain a claim limitation.'" *Bristol-Myers Squibb Co. v. Ben Venue Labs, Inc.*, 246 F.3d 1368, 1373 (Fed. Cir. 2001). Here, the claims themselves are structurally complete without the preamble, which means the preamble is not limiting. *Id.* at 1375 (preamble not limiting where "expression of intended result essentially duplicates the dosage amounts recited in the claims"). The "changes in surface topology" recited in the preamble are captured by the claim's recitation of how the "first surface topology" is updated with rescanned data. ('609 patent at 34:1–4.) The claim also recites "scan data of the patient's teeth" which is obtained during "[re]scanning." (*Id.* at 33:9.) At most, the preamble states the purpose of the claimed method as being part of a "dental procedure," but that does not convert the preamble into a claim limitation.

A preamble can limit a claim if the patentee placed "clear reliance on the preamble during prosecution to distinguish the claimed invention from the prior art." *Catalina Mktg. Int'l, Inc. v Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002). 3Shape argues that Align "recited the preamble" during prosecution of a related patent "to distinguish the claimed invention from the prior art," thereby limiting the claim. (3Shape Br. at 32.) That is not the case. The '936 patent was allowed after a rejection for double-patenting and a terminal disclaimer, so there was nothing to "distinguish" or overcome. (Ex. P, Feb. 21, 2020 Non-Final Rejection at 10.) And the only

amendments Align made to the '609 patent's claims concerned other aspects of the invention, as discussed above in connection with Issue H.2. (Ex. Q, Oct. 30, 2020 Amendments to the Claims at 2.) Even the Notices of Allowance that 3Shape references do not indicate that the language of the preamble had anything to do with the examiner's allowance. (*See* 3Shape Exs. 32 and 33.)

Finally, even if the preamble is limiting, 3Shape's proposed construction imports the same flawed "agency" limitation—making minor modifications to the claim language and tacking on "by a dental practitioner" at the end, as discussed in the prior section. *See* above at G.1. The Court should reject 3Shape's latest invitation to import that limitation into the preamble for the same reasons.

C.   [Issue H] The Meaning of Replacing or Updating a Virtual Model

1.   [H.1] "replace [replacing] at least a portion of the [removed] surface portion of the model […] using the received second scan data [at least a portion of the second scan data]" ('936 Patent, Cls. 1, 9, 17)

"Registering' concerns how new data is incorporated into the model after the rescan. ('936 patent at 31:1–4.) 3Shape's proposed construction rests on the logical fallacy that because registering can occur at the same time as replacing, "replacing" must mean "registering." 3Shape does not even argue that "replace" should always mean "register"—just that it has that meaning when "the delete/remove step is separated from the replace step." (3Shape Br. at 33.) Instead, 3Shape asks the Court to ignore the distinctions in the claims and specification between "replace" and "register" and treat them as interchangeable. This is an outcome-driven claim construction the Court should reject.

3Shape's proposed construction is incompatible with the claims. Dependent claims 4, 11, and 20 all specify that "registration" occurs at the same time as "replacement," whereas the associated independent claims do not. ('936 patent at 30:63–67, 31:47–52, 32:62–65.) 3Shape's construction renders these dependent claims surplusage, which shows the deficiency of the proposed construction. What's more, independent claim 17 recites both registering and replacing, leading to the bizarre result of either registering data twice or ignoring one of the claim limitations

under 3Shape's proposed construction. (*Id.* at 32:19–49.) Illogical constructions or those that do not

give meaning to all the terms are seldom proper. *Interactive Gift Express, Inc. v. Compuserve Inc.*, 256

F.3d 1323, 1336 (Fed. Cir. 2001); *Merck & Co. v. Teva Pharms. USA, Inc.*, 395 F.3d 1364, 1372 (Fed.

Cir. 2005). In addition, "different terms in the claims connotes different meanings." *CAE Screenplates*

Inc. v. Heinrich Fiedler GmbH & Co., 224 F.3d 1308, 1317 (Fed. Cir. 2000).

3Shape further ignores how "replace" and "register" are used in the specification. "Replace"

is as an alternative "computer-implemented function" to "delete" or "remove." ('936 patent at 7:50–

58.) In that context, "replace" has the same meaning that is set forth in Align's proposed

construction. Rather than discarding ("deleting") or otherwise taking something out ("removing")

without reference to what comes next, "replace" means to use one thing in the place of another.

(Ex. G, Merriam Webster's Collegiate Dictionary (11th ed. 2003) ("replace: 3. to put something new

in the place of").) But "register[ing]" is not a similar action to "delet[ing]" or "remov[ing]."

"Deleting," "removing," and "replacing" all act on the old data that will no longer be used. But

"register[ing]" concerns what to do with new data, not the old. ('936 patent at 25:5–15.)

In support of its construction, 3Shape also gestures towards supposed section 112 issues,

although it does not explain those issues or how their construction resolves them. 3Shape's declarant

does not even opine that the term "replace" lacks a reasonably certain meaning to those of skill in

the art. Such a lackluster showing does not amount to any evidence of invalidity, let alone clear and

convincing evidence, which is what is required before invoking validity as a canon of claim

construction. *See Abbott Labs. v. Baxter Pharm. Prods., Inc.*, 334 F.3d 1274, 1282 (Fed. Cir. 2003).

Regardless, these misguided validity arguments rely on the same faulty premise that "replace" has to

be understood only in the context of "registering." But that is not the context in which "replace" is

used throughout the specification, where it is described repeatedly as an alternative to "delete" or

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"remove." The Court should instead adopt Align's construction, which explains how "replacement" differs from both "deleting" and "removal."

> 2. **[H.2] "updating [update] the first model by modifying only at least a portion of the surface data [first surface portion]" ('609 Patent. Cls. 1, 12, 23)**

3Shape's indefiniteness argument is predicated on viewing only a portion of the claims, ignoring the rest, and arguing that its excised portion does not make sense in isolation. But a straightforward reading of the claims shows that "only at least a portion" makes perfect sense. "Only" specifies *which* grouping of data is updated, and "at least" specifies *how much* data is updated. The language may be prosaic, but definiteness is a question of meaning, not beauty.

Claim 1 recites a method for updating a scan of a patient's mouth during a dental procedure. The method begins with receiving scan data of the patient's mouth. ('609 patent at 30:35–43.) A model is then generated based on that data and displayed to the user. (*Id.* at 30:44–49.) On that model, the user then "demarcate[s]" a "first surface portion" and a "second surface portion." (*Id.* at 30:50–53.) The dependent claims make clear why this could happen: something is in the way that makes the "first surface portion" images unusable. (*Id.* at 31:1–5.) As is relevant here, the method concludes by: "updating the first model by ***modifying only at least a portion of the surface data representative of the first surface portion according to the user input*** using at least a portion of the second scan data of the patient's intraoral cavity including the first surface portion." (*Id.* at 30:60–64 (emphasis added).) Read in the context, "only" means that "only . . . the surface data representative of the first surface portion" is updated, not the "second surface portion" or associated data. This makes sense in the context of the claims because the "first surface portion" is what had possibly been "obscur[ed]." And so the "updat[e]" is only for the part of the model that needed updating.

The prosecution history reinforces this understanding. Claim 1 was amended during prosecution and the language "updating the first model by modifying only" was added in front of "at least a portion of the surface data" to arrive at the current claim language. (Ex. Q, Oct. 30, 2020 Amendments to the Claims at 2) ("~~replacing~~ updating the first model by modifying only at least a portion of the surface data representative of the first surface portion ~~having the first surface topology of the first model~~. . .").) The examiner then explained exactly what this language meant when distinguishing the claimed invention over the prior art in the Notice of Allowance. (3Shape Ex. 33 at 2 ("The claims as amended distinguish over the art of record, and the art as a whole via clarifying the updating scans only modify the first surface portion with the second scan data of the intraoral cavity, while leaving the rest of the model intact ('updating the first model by **modifying only**. . .')." (emphasis in original).) A person of ordinary skill would not share 3Shape's confusion.

Consistent with this history, "at least a portion" then tells the person of ordinary skill how much of the "first surface portion's" associated data is updated: not necessarily all of it, but "at least a portion." *Avago Techs. U.S., Inc. v. STMicroelectronics, Inc.*, No. 6:10-cv-92, 2011 WL 3439929, at *8 (E.D. Tex. Aug. 5, 2011) ("The plain and ordinary meaning of the term "portion" is easily understood by a jury, and no construction is required."). Before amendment, the claims made it clear that "at least a portion of the surface data" was being updated. (Ex. Q, Oct. 30, 2020 Amendments to the Claims at 2.)

D.   [Issue I] The Meaning of User Input Identifying Portions of a Model

1.   "receiving [receive] user input, via the displayed first model, demarcating the surface data representative of the first surface portion and the surface data representative of the second surface portion" ('609 Patent, Cls. 1, 12)

The disputed limitation concerns how a user identifies the portion of the model that will be updated through a second scan. For example, if a tooth is obscured and the resulting image is not usable, the user can circle the affected tooth on the display to "demarcat[e]" that area. The data from

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the second scan then only updates that circled area of the model (or "first surface portion"). But the second scan does not update the portions of the model that the user left alone (or the "second surface portion"). Align's proposed construction explains how these two different surface portions can be identified.

Align's proposed construction makes the claim language easier to understand in two ways. The first is to replace the more stilted term "demarcate" with the more understandable "identify." The specification frequently uses "identify" to refer to the process by which the user defines the "first surface portion" for updating. Figure 9 refers to this step as "marking/identifying." ('609 patent at Fig. 9, 450; 21:26–32.) Elsewhere, the specification describes this step using the term "identify," such as "identifying at least a portion of said virtual model that is desired to be modified by interacting with the displayed image." (*Id.* at 4:19–21.)

The other aspect of Align's proposed construction is to specify how a "second surface area" can be identified. A user can "demarcate" or "identify" a first and second "surface portion" within a single model in two ways. The user can explicitly identify the "second surface portion" on the display—*i.e.*, the part of the model that will not be modified. This is reflected in the "explicit identification" of the "second surface portion" in Align's proposed construction. 3Shape agrees that this action is encompassed within the relevant claims. (3Shape Br. at 35.)

The user can also identify the "second surface portion" by implication. When a user circles an obscured tooth on a display for rescanning or replacement, she has identified two surface portions. One consists of the tooth itself that will be rescanned (the "first surface portion"). The other portion consists of everything but the circled tooth (the "second surface portion"). By "identifying" the "first surface portion," the user has implicitly "identified" the second.

3Shape's proposed "plain and ordinary" meaning seeks to foreclose any implicit definition of the "second surface area." But that construction ignores the specification and would exclude

embodiments from the scope of the claims. The specification provides several examples where a user identifies "a portion of said virtual model that is desired to be modified by interacting with the displayed image." ('609 patent at 4:19–21.) In the language of the claims, the user has "identified" or "demarcated" the "first surface portion" (the part "to be modified") as well as the "second surface portion" (the part that is not "to be modified"). The user has no less identified the "second surface portion" than the "first surface portion" circled on the display. Indeed, the specification itself describes the user action as identifying a portion to modify while retaining the rest of the model— necessarily creating a "first" and "second surface portion." (*Id.* at 20:66–21:3 ("steps 430 to 470 are implemented when part of the first virtual model VM1 . . . is considered to be unsuitable or undesired, while concurrently it is desired to retain another part of the first virtual model VM1").

3Shape's proposed construction would also exclude several embodiments that describe how the user identifies the portion to modify (the "first surface portion") and implicitly identifies the portion to retain (the "second surface portion"). For example, the method set forth in the flow chart in Figure 9 would not be practiced by following the claims as interpreted by 3Shape. (*Id.* at Fig. 9.) The method fails to identify a separate "marking / identifying" step for the "second surface portion," which 3Shape says is required.

III.   HOLE CLOSING PATENT

The '527 or "Hole Closing" patent generally relates to manipulating an existing scan to fill in a portion of the scan that is missing. The parties disagree about two terms in the '527 patent.

A.   [Issue J] Determining a Missing Portion of the 3D Virtual Model (Cl. 1, 12)

3Shape asks the Court to construe this term very narrowly, to mean "determining [determine] *a missing dental structure* in the 3D virtual model." (3Shape Br. at 36 (emphasis added).)

The Court should not read "dental structure" into the claim language to specify what is "missing." The specification never refers to what is missing as a "dental structure;"[10] it refers to what is missing as "finish line data (and also emerging profile data) at the obscured portions of the finish line." ('527 patent at 7:38–40.) Nothing suggests that these "obscured portions of the finish line" must be hiding "dental structures" or anything else that is greater in size than what 3Shape calls (without definition or explanation) "*de minimis*." The specification teaches only that they are "areas… that do not include a finish line." (*Id.* at 10:3–4.) In at least some embodiments, this could be as simple as missing "a closed geometrical form." (*Id.* at 10:7–12; *accord, e.g.*, Claim 4 ("The method of claim 1, wherein the missing portion forms an incomplete closed geometrical form.").)

Align's construction—"determining a portion of the 3D virtual model that is missing a portion of any target part of the intraoral cavity of the patient"—is faithful to the claim language and the specification. 3Shape criticizes the use of "portion" twice, but that merely tracks the claim language itself ("determining [determine] a missing portion of the 3D virtual model that are missing a portion of the intraoral structure of the patient") and carries no suggestion that the separately referenced portions are "the same," as 3Shape argues. (3Shape Br. at 37.) 3Shape also says "target part" is "unclear and unhelpful," but the phrase "target part" is taken directly from the specification, where it is clearly and helpfully explained. (*See* '527 patent at 6:58–63 ("The target parts are the parts (also referred to interchangeably as zones or areas) of the intraoral cavity 200 which form the focus of a particular dental procedure for a particular patient and regarding which it is desired to obtain the 3D topographical or surface data thereof.").)

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[10] The specification uses the phrase "dental structure" only once ('527 patent at 2:21), and it is not in reference to what is "missing" in the 3D virtual model.

B.   [Issue K] The Scope of Generating Second 3D Data (Cl. 1, 12)

3Shape asks the Court to construe "generat[ing] second 3D data" very broadly, to "include generation by scanning." (3Shape Br. at 39.) But 3Shape's construction conflates two distinct technologies: "hole closing," claimed by the '527 patent, and "selective rescanning," claimed by the '936 and '609 patents.

Hole closing refers to computer manipulation of a 3D model after the model is already "obtained" (or "provided" or "generated") by scanning—with no additional scanning involved in the subsequent manipulation. (*See*, *e.g.*, '527 patent at Fig. 1 (showing only first step includes scanning, to obtain the model); *id.* at 3:24–38 ("present invention relates to a method for manipulating a virtual dental model," where the "virtual model may be provided by scanning"); *id.* at 7:37–40 ("the virtual model 500 obtained by the scanning process lacks finish line data (and also emerging profile data) at the obscured portions of the finish line").) Hole closing is thus like photo-shopping or retouching a photo; the method does not include any additional photography.

Selective rescanning is different. It involves supplementing a scanned model with data generated by additional, targeted scanning (hence "selective rescanning"). (*See* '609 patent at 4:14–25, 15:42–45, 25:53–56, 28:5–10; '936 patent at 4:3–14, 15:33–36, 25:43–46, 27:60–65.) Selective rescanning is analogous to taking additional photos to complete a partially incomplete photo.

3Shape cites "the specification's description of numerous methods of generating 3D data," (3Shape Br. at 38), without acknowledging the difference between "***first*** 3D data" and "***second*** 3D data." (*See*, *e.g.*, '527 patent, Claims 1 and 12 (emphases added).) The "methods of generating 3D data" relates to the former method of obtaining the model. (*See id.* at 7:41–8:60.) The latter (which is the disputed claim term) refers to the subsequent manipulation of the model. (*Id.* at 8:61–11:55.)

Align's proposed construction does not conflate hole-closing with selective rescanning or "first 3D data" with "second 3D data." Instead, it assists the jury by specifying that the method for

"generat[ing] second 3D data" is either extrapolating or interpolating, both of which are disclosed. (*See id.* at 4:7–12, 10:35–11:12; *id.* at Claims 6, 7, 17 and 18.) Contrary to 3Shape's argument, Align's construction does not cause the dependent claims limited to extrapolation *or* interpolation (*i.e.*, Claims 6, 7, 17 and 18) to violate the doctrine of claim differentiation, because each of those dependent claims remains narrower than the claim from which it depends.

3Shape also argues that Align's proposed construction presents a claim differentiation problem with respect to dependent Claims 8 and 19, both of which claim "the second 3D data is generated based on the 3D virtual model." (*See* 3Shape Br. at 40.) Claims 8 and 19 clearly serve to capture any method for generating second 3D data "based on the 3D virtual model" (*i.e.*, not based on additional scanning) that might be construed as distinguishable from both extrapolating and interpolating. If the Court sees a claim differentiation problem here, the Court can adjust Align's proposed construction slightly to address it, by construing "generat[ing] second 3D data" to mean "generat[ing] second data representing the intraoral structure of the missing portion of the 3D virtual model by extrapolating the 3D virtual model, interpolating between points in the 3D virtual model, or otherwise based on the 3D virtual model." That adjusted interpretation would still, properly, exclude scanning.

CONCLUSION

Align respectfully requests that the Court adopt its claim constructions.

Dated: July 2, 2021   By: */s/ Faye Paul Teller*

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that a true and correct copy of the above and foregoing

document has been served on all counsel of record via email.

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